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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/756,846	01/10/2001	Katsunobu Hori	50090-270	6055

7590

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McDermott, Will & Emery
600 13th Street, N.W.
Washington, DC 20005-3096

EXAMINER

VU, HUNG K

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 08/02/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

AKC

Office Action Summary

Application No.

09/756,846

Applicant(s)

HORI ET AL.

Examiner

Hung K. Vu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 May 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) 6-16 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4,5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

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DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of Embodiment 1 of Figures 1A-1F, Claims 1-5, in Paper No. 8 is acknowledged. The traversal is on the ground(s) that the Examiner failed to establish a prima facie case of independence or distinctness and a reason why the examination of the entire application would pose a serious burden on the Examiner. This is not found persuasive because Applicant is required under 35 U.S.C 121 to elect a single disclosed species for prosecution as described in Paper No. 6 and one application one invention.

The requirement is still deemed proper and is therefore made FINAL.

2. Claims 6-16 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected Invention, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in Paper No. 8.

Specification

3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

4. The disclosure is objected to because of the following informalities: On page 21, line 4, "mad" should be changed to "made" for clarity.

Appropriate correction is required.

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Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

Claims 1 and 5 are rejected under 35 U.S.C. 102(b) as being anticipated by Akira (JP4-372133, of record).

Akira discloses, as shown in Figures 1(a) - 1(d), a semiconductor device comprising,

a thick film wiring (7) having a first film thickness;

a thin film wiring (6) having a second film thickness that is smaller than the first film thickness;

a hard mask (4) covering the surface of the thick film therewith;

wherein the hard mask is resistant to etching adapted for patterning of the thick film wiring and also to etching adapted for patterning of the thin film wiring, while being resistant to heat.

Note that the term “formed in a single layer” is method recitation in a device claimed, and it is non-limiting, because only the final product is relevant, not the method of making. A product by

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process claim is directed to the product per se, no matter how actually made. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claimed in “product by process” claims or not.

With regard to claim 5, Akira discloses the thick film wiring serves as a wiring for an electric supply of the semiconductor device or as a wiring for ground.

6. Claims 1 and 5 are rejected under 35 U.S.C. 102(b) as being anticipated by Yoshihiko (JP2-264432, of record).

Yoshihiko discloses, as shown in Figure 2(d), a semiconductor device comprising,

- a thick film wiring (13, left) having a first film thickness;

- a thin film wiring (13, right) having a second film thickness that is smaller than the first film thickness;

- a hard mask (14,15) covering the surface of the thick film therewith;

- wherein the hard mask is resistant to etching adapted for patterning of the thick film wiring and also to etching adapted for patterning of the thin film wiring, while being resistant to heat.

Note that the term “formed in a single layer” is method recitation in a device claimed, and it is non-limiting, because only the final product is relevant, not the method of making. A product by process claim is directed to the product per se, no matter how actually made. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claimed in “product by process” claims or not.

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With regard to claim 5, Yoshihiko discloses the thick film wiring serves as a wiring for an electric supply of the semiconductor device or as a wiring for ground.

7. Claims 1 and 5 are rejected under 35 U.S.C. 102(e) as being anticipated by Schoenfeld et al. (PN 6,396,727).

Schoenfeld et al. discloses, as shown in Figures 2, 4, 6 and 7, a semiconductor device comprising,

- a thick film wiring (region 20) having a first film thickness;

- a thin film wiring (region 22) having a second film thickness that is smaller than the first film thickness;

- a hard mask (18) covering the surface of the thick film therewith;

- wherein the hard mask is resistant to etching adapted for patterning of the thick film wiring and also to etching adapted for patterning of the thin film wiring, while being resistant to heat.

Note that the term “formed in a single layer” is method recitation in a device claimed, and it is non-limiting, because only the final product is relevant, not the method of making. A product by process claim is directed to the product per se, no matter how actually made. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claimed in “product by process” claims or not.

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With regard to claim 5, Schoenfeld et al. discloses the thick film wiring serves as a wiring for an electric supply of the semiconductor device or as a wiring for ground.

8. Claims 1 and 3 are rejected under 35 U.S.C. 102(b) as being anticipated by Doan et al. (PN 5,346,587).

Doan et al. discloses, as shown in Figures 4A and 4C, a semiconductor device comprising,

a thick film wiring (34, left) having a first film thickness;

a thin film wiring (34, right) having a second film thickness that is smaller than the first film thickness;

a hard mask (35,37) covering the surface of the thick film therewith;

wherein the hard mask is resistant to etching adapted for patterning of the thick film wiring and also to etching adapted for patterning of the thin film wiring, while being resistant to heat.

Note that the term “formed in a single layer” is method recitation in a device claimed, and it is non-limiting, because only the final product is relevant, not the method of making. A product by process claim is directed to the product per se, no matter how actually made. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claimed in “product by process” claims or not.

With regard to claim 3, Doan et al. discloses the hard mask comprises a silicon nitride film.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akira (JP4-372133, of record) in view of Tao et al. (PN 6,399,515).

Akira discloses all of the claimed limitations except the material of the hard mask comprises a silicon oxide film or a silicon nitride film. However, Tao et al. discloses a hard mask having the material comprising a silicon oxide film or a silicon nitride film. Note Figure 8 of Tao et al.. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the hard mask of Akira having the material comprising a silicon oxide film or a silicon nitride film, such as taught by Tao et al. because a silicon oxide film or a silicon nitride film is commonly used as the mask to etch the layer formed below it.

10. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Akira (JP4-372133, of record) in view of Williams (PN 6,087,269).

Akira discloses all of the claimed limitations except the material of the hard mask comprises a tungsten film. However, Williams discloses a hard mask having the material comprising a tungsten film. Note Figure 6 of Williams. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the hard mask of Akira having the material comprising a tungsten film, such as taught by Williams in order to provide

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the advantage of increased resolution because of the thinner resist as well as the possibility of increased interconnect thickness which provides for greater current handling capability.

11. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshihiko (JP2-264432, of record) in view of Tao et al. (PN 6,399,515).

Yoshihiko discloses all of the claimed limitations except the material of the hard mask comprises a silicon oxide film or a silicon nitride film. However, Tao et al. discloses a hard mask having the material comprising a silicon oxide film or a silicon nitride film. Note Figure 8 of Tao et al.. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the hard mask of Yoshihiko having the material comprising a silicon oxide film or a silicon nitride film, such as taught by Tao et al. because a silicon oxide film or a silicon nitride film is commonly used as the mask to etch the layer formed below it.

12. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshihiko (JP2-264432, of record) in view of Williams (PN 6,087,269).

Yoshihiko discloses all of the claimed limitations except the material of the hard mask comprises a tungsten film. However, Williams discloses a hard mask having the material comprising a tungsten film. Note Figure 6 of Williams. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the hard mask of Yoshihiko having the material comprising a tungsten film, such as taught by Williams in order to provide the advantage of increased resolution because of the thinner resist as well as the possibility of increased interconnect thickness which provides for greater current handling capability.

13. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schoenfeld et al. (PN 6,396,727) in view of Tao et al. (PN 6,399,515).

Schoenfeld et al. discloses all of the claimed limitations except the material of the hard mask comprises a silicon oxide film or a silicon nitride film. However, Tao et al. discloses a hard mask having the material comprising a silicon oxide film or a silicon nitride film. Note Figure 8 of Tao et al.. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the hard mask of Schoenfeld et al. having the material comprising a silicon oxide film or a silicon nitride film, such as taught by Tao et al. because a silicon oxide film or a silicon nitride film is commonly used as the mask to etch the layer formed below it.

14. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schoenfeld et al. (PN 6,396,727) in view of Williams (PN 6,087,269).

Schoenfeld et al. discloses all of the claimed limitations except the material of the hard mask comprises a tungsten film. However, Williams discloses a hard mask having the material comprising a tungsten film. Note Figure 6 of Williams. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the hard mask of Schoenfeld et al. having the material comprising a tungsten film, such as taught by Williams in order to provide the advantage of increased resolution because of the thinner resist as well as the possibility of increased interconnect thickness which provides for greater current handling capability.

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15. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Doan et al. (PN 5,346,587) in view of Tao et al. (PN 6,399,515).

Doan et al. discloses all of the claimed limitations except the material of the hard mask comprises a silicon oxide film. However, Tao et al. discloses a hard mask having the material comprising a silicon oxide film or a silicon nitride film. Note Figure 8 of Tao et al.. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the hard mask of Doan et al. having the material comprising a silicon oxide film, such as taught by Tao et al. because a silicon oxide film and a silicon nitride film is commonly used as the mask and they are interchangeable.

16. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Doan et al. (PN 5,346,587) in view of Williams (PN 6,087,269).

Doan et al. discloses all of the claimed limitations except the material of the hard mask comprises a tungsten film. However, Williams discloses a hard mask having the material comprising a tungsten film. Note Figure 6 of Williams. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the hard mask of Doan et al. having the material comprising a tungsten film, such as taught by Williams in order to provide the advantage of increased resolution because of the thinner resist as well as the possibility of increased interconnect thickness which provides for greater current handling capability.

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Conclusion

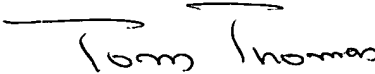
17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hung K. Vu whose telephone number is (703) 308-4079. The examiner can normally be reached on Mon-Thurs 7:00-5:30, Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Vu

July 22, 2002


TOM THOMAS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800